



FAO: Andy Hayton
Allenby Commercial

Date: 28th April 2020

FURTHER ROTARY BOREHOLE INVESTIGATION LETTER REPORT

**Twibell Street, Barnsley
S191055**

Dear Mr Hayton,

Solmek were instructed by Allenby Commercial and Peel Developments to undertake further coal mining site investigation on a parcel of land at Twibell Street, Barnsley.

Sources of information, including previous work undertaken at the site, are detailed below:

- *Solmek Phase 1 Desk Study (S190553) June, 2019*
- *Solmek Phase 2 Site Investigation (S191055) January, 2020*

Reference should be made to the above report for details of the site's history and environmental setting, the ground conditions encountered and the results of historical drilling and contamination analysis.

Following the completion of the Phase 2 Site Investigation Report, Solmek recommended further rotary drilling was undertaken to investigate the possibility that the encountered coal represents pillars, meaning workings could be present elsewhere beneath the site. As a result, three further rotary boreholes were proposed.

The fieldwork and testing was generally carried out according to the recommendations of BS5930: 2015 "Code of Practice for Ground Investigations" and where applicable BS EN 1997-2:2007 with soil descriptions to BS EN 14688-1:2002 where applicable. The information provided in this report is based on the investigation fieldwork and is subject to the comments and approval of the various regulatory authorities.

There may be other conditions prevailing on the site which have not been disclosed by this investigation and which have not been taken into account by this report. Solmek reserve the right to alter conclusions and recommendations should further information be available or provided. Any schematic representation or opinion of the possible configuration of ground conditions between exploratory holes is conjectural and given for guidance only and confirmation of intermediate ground conditions should be considered if deemed necessary.

Fieldwork

The additional fieldwork was undertaken on 9th April 2020.

The scope of works included:

- 3no. openhole rotary boreholes (RBH4 to RBH6) drilled to a maximum depth of 25.00mbgl.
 - These boreholes were positioned to investigate areas not previously investigated by RBH1-RBH3.
 - Given the findings of the previous boreholes, it was considered appropriate to drill to investigate potential ancient unrecorded coal workings at depths of <25mbgl.

A site location map (Figure 1) and borehole position map (Figure 2) are appended to this letter along, with the rotary borehole logs.

GROUND CONDITIONS

A summary of the ground conditions encountered is given below.

Made Ground

Within the additional boreholes, made ground was proven to between 0.90 (RBH6) and 1.10mbgl (RBH4). The made ground generally comprised tarmac or concrete overlying sandy gravel of brick and ash. Within RBH5, a sub-base of gravel was noted beneath the tarmac.

Natural Deposits

The natural material proven in the additional boreholes generally comprised firm consistency sandy gravelly clay, which was proven to depths of between 1.70 and 2.90mbgl. Within RBH5 and RBH6, this was underlain by a band of sand (0.60-0.70m thick).

Solid Geology

Within the additional boreholes, rockhead was proven at depths of between 2.30mbgl (RBH5) and 3.40mbgl (RBH6). The rock was proven to initially comprise sandstone (1.80-4.00m thick) overlying a thick band of mudstone (3.30-8.30m thick).

A band of intact coal (1.10-1.20m thick) was then encountered within all three boreholes.

The remainder of the solid geology generally comprised mudstone or interbedded mudstone and sandstone.

With respect to coal seams, Table 1 below summarises the coal seams that were encountered within both the additional and the original rotary boreholes.

TABLE 1: COAL SEAM SUMMARY

Location	Strata	Top of Strata (mbgl)	Bottom of Strata (mbgl)	Flush Returns	Notes
RBH1	Coal – Intact	11.00	12.20	100%	Possible Low Beamshaw seam
	Coal – Intact	22.60	23.70	100%	Possible Top Beamshaw seam
RBH2	Coal – Intact	18.40	19.00	100%	Possible Low Beamshaw seam
RBH3	Coal – Intact	10.70	12.00	100%	Possible Low Beamshaw seam
RBH4	Coal – Intact	13.10	14.30	100%	Possible Low Beamshaw seam
RBH5	Coal – Intact	12.40	13.50	100%	Possible Low Beamshaw seam
RBH6	Coal – Intact	9.20	10.35	100%	Possible Low Beamshaw seam

Groundwater

Groundwater was encountered between 11.90 and 12.10mbgl within RBH4 and RBH5 only.

It should be noted the rapid rate of advancement of the exploratory holes may mask minor seepages and it should be borne in mind that water levels fluctuate with a number of influences including season, rainfall, dewatering and pumping activities. Therefore, water levels significantly higher than those found during this investigation may be encountered.

MINING ASSESSMENT

The ten times seam thickness rule states that where competent rock exceeds ten times the extracted seam thickness then no major crown holing should occur at the surface (Structural Foundations Manual; M. F. Atkinson, Spon Press 2003). If the competent rock cover is less than ten times the extracted seam thickness, then recommendations suggest the workings must be grouted using a mixture of pulverised fuel ash (PFA) and cement placed into the area under pressure. For a transition zone of 6-10 times the seam thickness, it may be acceptable to consider the use of raft foundations subject to approval from the regulatory authorities. However, the use of 6 to 10 times the seam thickness is not appropriate for steeply dipping seams and where strong flowing water is encountered.

The ratios within the rotary boreholes where coal was encountered are given in Table 2 below, as well as the related foundation solution required by such a ratio.

In order to represent the conservative possibility that the intact coal encountered represents pillars, with voids potentially present elsewhere, ratios have been provided for each of these seams, as well as the related foundation solution required by such a ratio.

TABLE 2: RATIOS OF COAL THICKNESS TO ROCK COVER

Borehole Reference	Depth (mbgl)	Remarks	Flush Returns (%)	Overlying Solid Geology Thickness	Coal, Coal Workings or Void Thickness	Ratio	Foundation Type
RBH1	11.00-12.20	Intact coal	100	8.10m	1.20m	6.75	Raft
	22.60-23.70	Intact coal	100	10.40m	1.10m	9.45	Raft
RBH2	18.40-19.00	Intact coal	100	15.50m	0.60m	25.83	Standard
RBH3	10.70-12.00	Intact coal	100	8.20m	1.30m	6.30	Raft
RBH4	13.10-14.30	Intact coal	100	10.20m	1.20m	8.50	Raft
RBH5	12.40-13.50	Intact coal	100	10.10m	1.10m	9.18	Raft
RBH6	9.20-10.35	Intact coal	100	5.80m	1.15m	5.04	Raft

The encountered seams across the site were all intact, and it is therefore considered unlikely that these seams may have been worked elsewhere beneath the site, given the absence of any loss of flush during drilling within any of the six boreholes drilled to date.

Although the ratios calculated are <10, this was based on a conservative assumption that the intact coal represented pillars. Given that all six boreholes encountered intact coal, it is considered unlikely that these are pillars and it is more likely that the coal encountered represents an unworked seam.

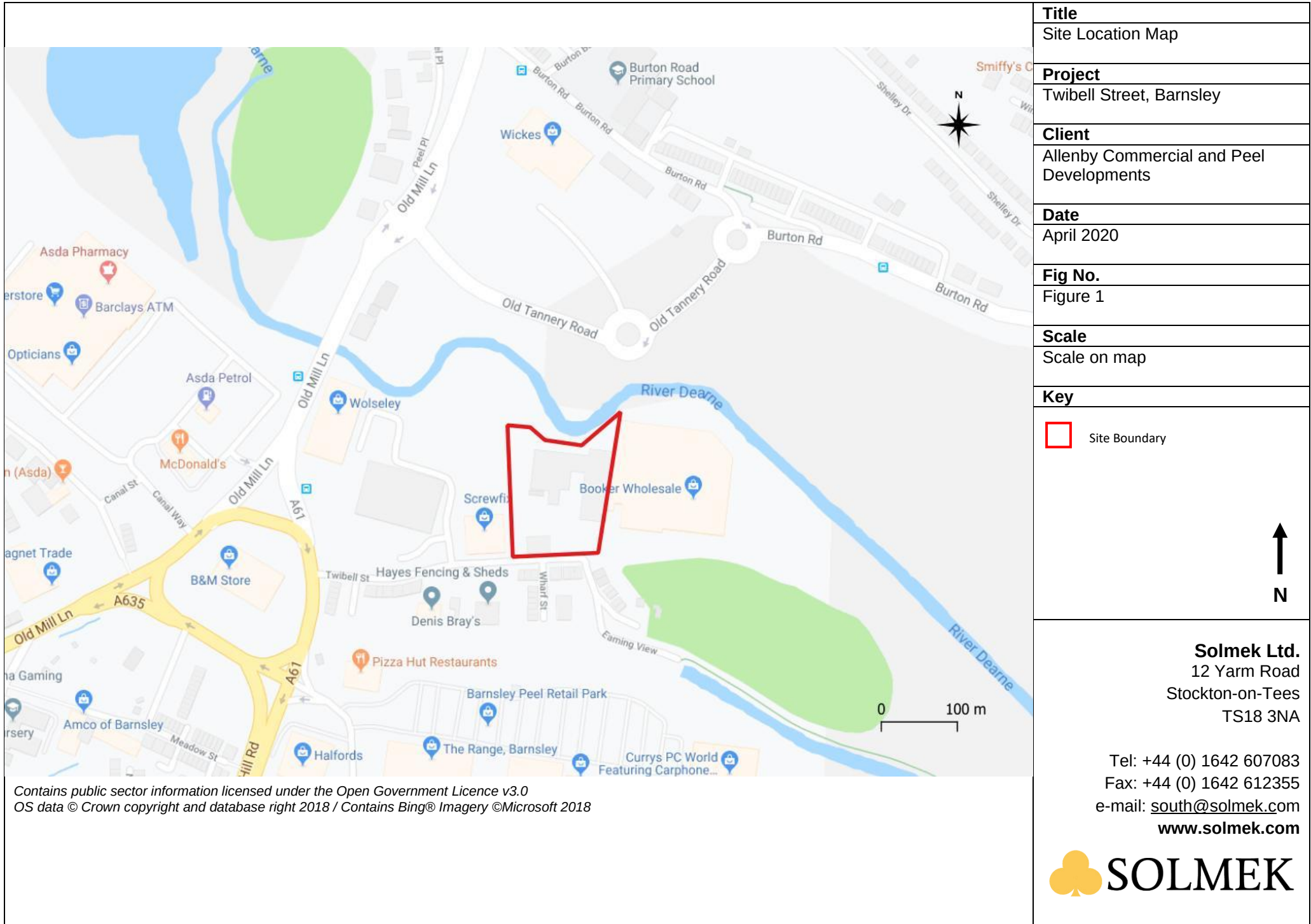
Given the absence of any voids or workings based on the available evidence, it is considered that no further mitigation is required, due to the inferred absence of shallow workings beneath the site.

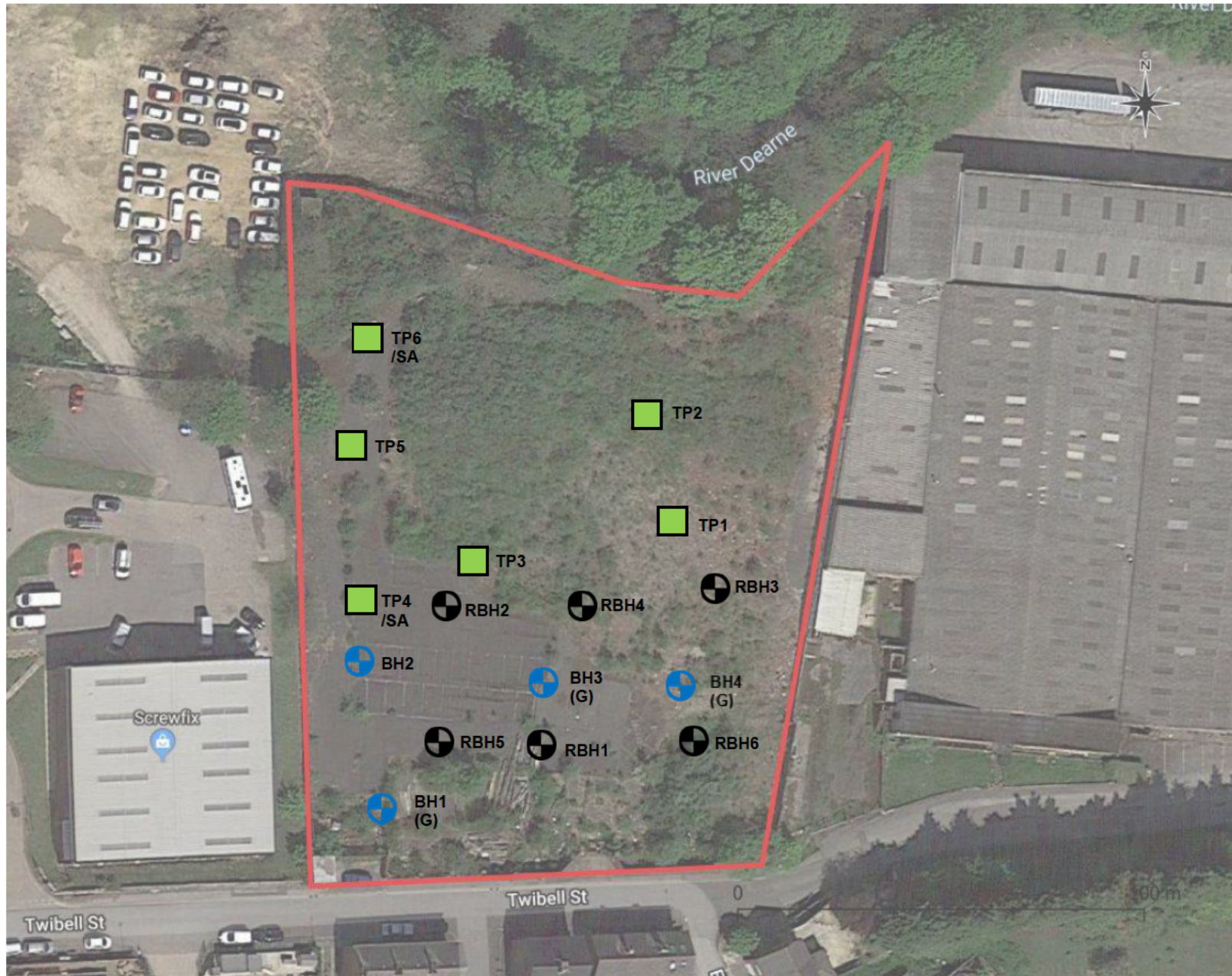
Further advice should be sought from Solmek if unexpected ground conditions are encountered during redevelopment.

Yours sincerely,



Leo Cassidy
On behalf of Solmek Ltd

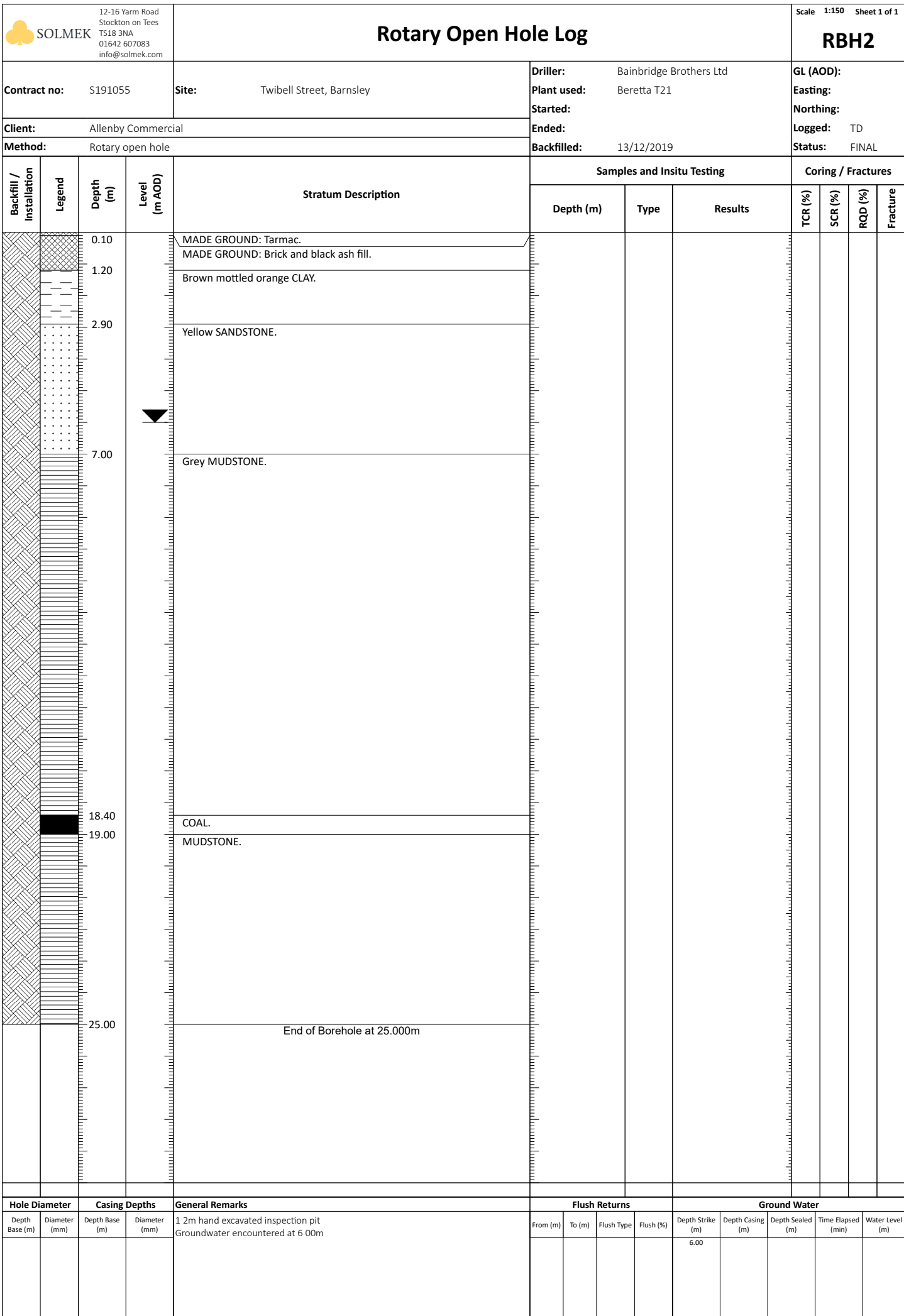


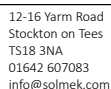


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Title	Approximate Borehole Location Plan
Project	Twibell Street, Barnsley
Client	Allenby Commercial and Peel Developments
Date	April 2020
Fig No.	Figure 2
Scale	Scale on map
Key	 Small Percussive Borehole (G) Gas Pipe Installed  Trial Pit/Soakaway  Rotary Borehole  N
Solmek Ltd. 12 Yarm Road Stockton-on-Tees TS18 3NA Tel: +44 (0) 1642 607083 Fax: +44 (0) 1642 612355 e-mail: south@solmek.com www.solmek.com  SOLMEK	

 12-16 Yarm Road Stockton on Tees TS18 3NA 01642 607083 info@solmek.com				Rotary Open Hole Log							Scale 1:150 Sheet 1 of 1				RBH1													
Contract no: S191055				Site: Twibell Street, Barnsley				Driller: Bainbridge Brothers Ltd Plant used: Beretta T21 Started: Ended: Backfilled: 13/12/2019				GL (AOD): Easting: Northing: Logged: TD Status: FINAL																
Client: Allenby Commercial																												
Method: Rotary open hole																												
Backfill / Installation	Legend	Depth (m)	Level (m AOD)	Stratum Description	Samples and Insitu Testing			Coring / Fractures																				
					Depth (m)	Type	Results	TCR (%)	SCR (%)	RQD (%)	Fracture																	
		0.10		MADE GROUND: Tarmac. MADE GROUND: Brick and black ash fill.																								
		2.90		SANDSTONE.																								
		6.60		Grey MUDSTONE.																								
		11.00		COAL																								
		12.20		Grey SANDSTONE.																								
		22.60		COAL.																								
		23.70		Grey MUDSTONE.																								
		30.00		End of Borehole at 30.000m																								
		Hole Diameter												Casing Depths		General Remarks				Flush Returns				Ground Water				
		Depth Base (m)	Diameter (mm)	Depth Base (m)										Diameter (mm)	1 2m hand excavated inspection pit No groundwater encountered				From (m)	To (m)	Flush Type	Flush (%)	Depth Strike (m)	Depth Casing (m)	Depth Sealed (m)	Time Elapsed (min)	Water Level (m)	
25.00	50																											
30.00	50																											





Rotary Open Hole Log

Scale 1:150 Sheet 1 of 1

RBH3

Contract no: S191055

Site: Twibell Street, Barnsley

Driller:	Bainbridge Brothers Ltd
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Plant used: Beretta T21

Started:

Ended:

Backfilled:	13/12/2019
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GL (AOD):

Easting:

Northing:

Logged: TD

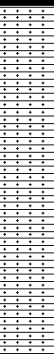
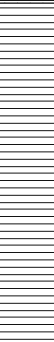
Status: FINAL

Client:	Allenby Commercial
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Method:	Rotary open hole
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[illegible]

 SOLMEK 12-16 Yarm Road Stockton on Tees TS18 3NA 01642 607083 info@solmek.com		Rotary Open Hole Log						Scale 1:125 Sheet 1 of 1		RBH4	
Contract no: S191055		Site: Twibell Street, Barnsley				Driller: ID Drilling			GL (AOD):		
						Plant used: Massenza MI3			Easting:		
Client: Allenby Commercial and Peel Developments						Started: 09/04/2020			Northing:		
Method: Rotary open hole						Ended: 09/04/2020			Logged: TD		
						Backfilled: 09/04/2020			Status: FINAL		
Backfill / Installation	Legend	Depth (m)	Level (m AOD)	Stratum Description	Samples and Insitu Testing			Coring / Fractures			
					Depth (m)	Type	Results	TCR (%)	SCR (%)	RQD (%)	Fracture
         	         	0.10		MADE GROUND: Tarmac.							
		1.10		MADE GROUND: Brownish red slightly clayey sandy gravel. Gravel is fine to coarse angular to subangular of brick and ash.							
				Firm consistency mottled dark brown slightly gravelly slightly sandy CLAY. Gravel is fine to medium subangular to subrounded consisting of sandstone and mudstone. Sand is fine to medium.							
		2.90		Yellow SANDSTONE.							
		6.90		Grey MUDSTONE.							

 SOLMEK 12-16 Yarm Road Stockton on Tees TS18 3NA 01642 607083 info@solmek.com				Rotary Open Hole Log							Scale 1:125 Sheet 1 of 1				RBH5	
Contract no: S191055				Site: Twibell Street, Barnsley				Driller: ID Drilling Plant used: Massenza MI3 Started: 09/04/2020 Ended: 09/04/2020 Backfilled: 09/04/2020				GL (AOD): Easting: Northing: Logged: TD Status: FINAL				
Client: Allenby Commercial and Peel Developments				Method: Rotary open hole												
Backfill / Installation	Legend	Depth (m)	Level (m AOD)	Stratum Description	Samples and Insitu Testing			Coring / Fractures								
					Depth (m)	Type	Results	TCR (%)	SCR (%)	RQD (%)	Fracture					
		0.10		MADE GROUND: Tarmac.												
		0.30		MADE GROUND: Yellowish white fine to medium subangular gravel consisting of limestone, dolomite. and concrete (Sub-base).												
		1.00		MADE GROUND: Brownish red slightly clayey sandy gravel. Gravel is fine to coarse angular to subangular of brick and ash.												
		1.70		Firm consistency mottled dark brown slightly gravelly slightly sandy												
		2.30		CLAY. Gravel is fine to medium subangular to subrounded consisting of sandstone and mudstone. Sand is fine to medium.												
				Brown SAND.												
				SANDSTONE.												
		4.10		Grey MUDSTONE.												
		12.40		Intact COAL.												
		13.50		MUDSTONE/SANDSTONE.												
		19.30		Grey MUDSTONE.												
25.00				End of Borehole at 25.000m												
Hole Diameter		Casing Depths		General Remarks		Flush Returns				Ground Water						
Depth Base (m)	Diameter (mm)	Depth Base (m)	Diameter (mm)	1 2m hand excavated inspection pit Groundwater encountered at 11 90m		From (m)	To (m)	Flush Type	Flush (%)	Depth Strike (m)	Depth Casing (m)	Depth Sealed (m)	Time Elapsed (min)	Water Level (m)		
25.00	50					0.00	25.00	Water	100	11.90						

 SOLMEK 12-16 Yarm Road Stockton on Tees TS18 3NA 01642 607083 info@solmek.com				Rotary Open Hole Log										Scale 1:125 Sheet 1 of 1		RBH6	
Contract no: S191055				Site: Twibell Street, Barnsley						Driller: ID Drilling Plant used: Massenza MI3 Started: 09/04/2020 Ended: 09/04/2020 Backfilled: 09/04/2020				GL (AOD): Easting: Northing: Logged: TD Status: FINAL			
Client: Allenby Commercial and Peel Developments				Method: Rotary open hole													
Backfill / Installation	Legend	Depth (m)	Level (m AOD)	Stratum Description	Samples and Insitu Testing			Coring / Fractures									
					Depth (m)	Type	Results	TCR (%)	SCR (%)	RQD (%)	Fracture						
		0.10		MADE GROUND: Concrete.													
		0.90		MADE GROUND: Brownish red slightly clayey sandy gravel. Gravel is fine to coarse angular to subangular of brick and ash.													
				Firm consistency mottled dark brown slightly gravelly sandy CLAY. Gravel is fine to medium subangular to subrounded consisting of sandstone and mudstone. Sand is fine to medium.													
		2.70		Brown SAND.													
		3.40		SANDSTONE.													
		5.90		Grey MUDSTONE.													
		9.20		Intact COAL.													
		10.35		MUDSTONE.													
																	
																	
																	
																	
																	
																	
																	
																	
																	
																	
																	
																	

♣Solmek conditions of offer, notes on limitations & basis for contract (ref: version1/2020)

These conditions accompany our tender and supercede any previous conditions issued. Solmek will prepare a report solely for the use of the Client (the party invoiced) and its agent(s). No reliance should be placed on the contents of this report, in whole or in part by 3rd parties. The report, its content and format and associated data are copyright, and the property of Solmek. Photocopying of part or all of the contents, transfer or reproduction of any kind is forbidden without written permission from Solmek. A charge may be levied against such approval, the same to be made at the discretion of Solmek.

Solmek cannot be held liable and do not warrant, or otherwise guarantee the validity of information provided by third parties and subsequently used in our reports. Solmek are not responsible for the action negligent of otherwise of subcontractors or third parties.

Site investigation is a process of sampling. The scope and size of an investigation may be considered proportional to levels of confidence regarding the ground and groundwater conditions. The exploratory holes undertaken investigate only a small volume of the ground in relation to the overall size of the site, and can only provide a general indication of site conditions. The opinions provided and recommendations given in this report are based on the ground conditions as encountered within each of the exploratory holes. There may be different ground conditions elsewhere on the site which have not been identified by this investigation and which therefore have not been taken into account in this report. Reports are generally subject to the comments of the local authority and Environment Agency. The comments made on groundwater conditions are based on observations made at the time that site work was carried out. It should be noted that mobile contamination, ground gas levels and groundwater levels may vary owing to seasonal, tidal and/or weather related effects. Solmek cannot be held liable for any unrecorded or unforeseen obstructions between exploratory boreholes and trial pits. This includes instances where previous structures on the site (buried man made structures) or the presence of boulder clay (cobbles and/or boulder obstructions) have been anticipated. All types of piling operations should make allowance for obstructions within the construction budget to accommodate this. Unrecorded ancient mining may occur anywhere where seams that have been worked and influence the rock and soil above. Dissolution cavities can occur where gypsum or chalk is present. Rotary drilling is the recommended technique to prove the integrity of the rock.

Where the scope of the investigation is limited via access to information, time constraints, equipment limitations, testing, interpretation or by the client or his agents budgetary constraints, elements not set out in the proposal and excluded from the report are deemed to be omitted from the scope of the investigation.

Desk studies are generally prepared in accordance with RICS guidelines. Environmental site investigations are generally undertaken as 'exploratory investigations' in accordance with the definitions provided in paragraph 5.4 of BS 10175:2011 in order to confirm the conceptual assumptions. You are advised to familiarize yourself with the typical scope of such an investigation. No pumping of water will be undertaken unless a licence or facilities/equipment have been arranged by others.

Where the type, number or/and depth of exploratory hole is specified by others, Solmek cannot and will not be responsible for any subsequent shortfall or inadequacy in data, and any consequent shortfall in interpretation of environmental and geotechnical aspects which may be required at a later date in order to facilitate the design of permanent or temporary works.

All information acquired by Solmek in the course of investigation is the property of Solmek, and, only also becomes the joint property of the Client only on the complete settlement of all invoices relating to the project. Solmek reserve the right to use the information in commercial tendering and marketing, unless the Client expressly wishes otherwise in writing. The quoted rates do not include VAT, and payment terms are 30 days from dispatch of invoice from our offices. Quotes are subject to a site visit.

We have allowed for 1 mobilisation and normal working hours unless otherwise stated. The scope of the investigation may be reviewed following the desk study and/or fieldwork. The presence or otherwise of Japanese Knotweed or other invasive plants can be difficult to identify especially during winter months. If Japanese Knotweed or other invasive species are suspect, it should be confirmed by an ecologist. We have not allowed for acquiring services information, and cannot be responsible for damage to underground services or pipes not shown to us or not clearly shown on plans. Costs incurred will be passed on to you, and in commissioning Solmek you understand and accept that you/your agent have a contractual relationship with Solmek & you accept this. Our rates assume unobstructed, reasonably level and firm access to the exploratory positions and adequate clear working areas and headroom. We have priced on the basis that you or your client have the necessary permissions, wayleaves and approvals to access land. All boreholes and pits are backfilled with arisings except where gas monitoring pipes are installed with stopcock covers. Solmek are not responsible for any uneven surfaces as a result of siteworks and rutting and backfilled excavations may require re-levelling and/or making good by others after fieldwork is complete, and Solmek has not allowed for this. No price has been provided or requested for a return visit to remove pipework and covers. Hourly rates apply to consultancy only and do not include expenses unless otherwise shown. If warranties are required, legal costs incurred will be passed on to you assuming Solmek agree to complete such warranties, modified or otherwise and you understand and agree to pay all costs.

We reserve the right to pursue full payment of the invoice prior to release of any information including reports. We advise you/your client that we may elect to pursue our statutory rights under late payment legislation, and will apply 8% to the base rate for unreasonably late payments. Solmek are exempt from the CIS Scheme. Solmek offer to undertake work only in strict accordance with conditions covered by our current insurances, which are available for inspection. Solmek are not responsible for acts, negligent or otherwise of subcontractors and as a matter of policy cannot indemnify any other parties. Professional indemnity Insurance is limited to ten times the invoice net total except where stated otherwise by Solmek. Solmek give notice that consequential loss as a direct or indirect result of Solmek's activities or omission of the same are excluded.